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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/607,045 | 06/27/2003 | Ryuzo Okada | 238395US2RD | 6417 |

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| EXAMINER | |
|---|---|
| SENFI, BEHROOZ M | |
| **ART UNIT** | **PAPER NUMBER** |
| 2621 | |
| **NOTIFICATION DATE** | **DELIVERY MODE** |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/607,045 | OKADA ET AL. | |
| | **Examiner** | **Art Unit** | |
| | BEHROOZ SENFI | 2621 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *12 May 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,3-9,11-17 and 19-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5,7-9,11,15-17 and 19-21* is/are rejected.

7)☒ Claim(s) *6 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. Applicant's arguments, see remarks, filed 5/12/2008, with respect to the rejection(s) of claim(s) 5 and 13 under 35 U.S.C. 112, first paragraph have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Taniguchi (US 6,456,730) and Takeda et al. (US 5,777,690).

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3-5, 7, 9, 11-13, 15, 17, 19 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi (US 6,456,730) in view of Takeda et al. (US 5,777,690).

Regarding claim 1, Taniguchi '730 discloses, an image processing apparatus (i.e., fig. 1, image processing 10) comprising: means for inputting a plurality of frame images serving as video images (i.e., fig. 1, image input section 12 for inputting plurality of images), means for detecting, from each frame image in the plurality of frame images a straight-line component in a direction in the frame image (i.e., figs. 3–7, col. 4, lines 45–57, detecting the straight line in the frame image which would have a direction), means for generating an obstacle candidate area as an image area in a vicinity of the detected straight-line component (i.e., figs. 3-4, 6 and 11–14, cols. 4-5, lines 15–55, cols. 6-8, lines 40–2, disclosing generation of obstacle candidate

blocks/areas in the vicinity of the white line, e.g., straight line, to detect the moving object), means for tracking the obstacle candidate area in an image succeeding each frame image in the plurality of frame images (i.e., figs. 10–12, illustrates time series images t0-1 through t0-10 to correctly detect, e.g., track, the moving objects, col. 2, lines 16-26, cols. 3-4, lines 52-18 and col. 5, lines 55-67), and producing a tracking result for the obstacle candidate area (i.e., figs. 11–12, illustrates the tracking result, col. 6, lines 16-55), means for determining using the tracking result of three or more obstacle candidate areas, whether the three or more obstacle candidate areas belong to a plane extending in a specific direction (it is noted that, fig. 13, illustrates the obstacle candidate areas in a specific plane, it is clear that each and every plane extend in a specific direction with respect to X and Y coordinates or Xz and Yz coordinates, further as shown in the figs. 12-14, the obstacle candidate areas are determined by using histogram to represent the block of the moving object in time series images, col. 6, lines 1 – 55 and cols. 7-8, lines 53-2) and producing a determination result (it is noted that, producing the obstacle position and histogram for moving quantity as shown in figs. 11 – 13 consider as determination result, col. 6, lines 1–55 and cols. 7-8, lines 53-21), and means for detecting an obstacle based on the determination result (i.e., fig. 12, detection of obstacle/object step d5 based on the determination result of steps d1-d4).

Taniguchi suggest detection of the white line as a straight line and indicates the straight line in three dimensional scene appear as a non-straight line (i.e., col. 5, lines 15-22), but does not explicitly indicates horizontal direction.

Takeda (i.e., col. 3, lines 23-43) teaches extracting a section horizontal with a temporally moving direction among a group of images and obtaining straight lines thus would be in horizontal direction representing position changes of the object.

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify and improve the processing of moving object detection of Taniguchi in accordance with the teaching of Takeda by extracting horizontal section with a temporal moving direction of the object to obtain the straight lines in horizontal direction representing the position changes of the object between images to accurately and stably detect the moving object, as suggested by Takeda (i.e., col. 1, lines 65-67).

Regarding claim 3, the combination of Taniguchi and Takeda teaches, the image processing apparatus according to claim 1, wherein the means for determining determines whether the three or more obstacle candidate areas belong to a horizontal plane (i.e., figs. 13 – 14, col. 6, lines 1 – 15, indicating searching, e.g., searching candidate areas, is executed along the X axis, e.g., horizontal plane, to detect the candidates areas in X axis plane of Taniguchi).

Regarding claim 4, the combination of Taniguchi and Takeda teaches, means for setting an image area in a vicinity of the detected straight-line component as a search area for the obstacle candidate area (i.e., figs. 3-4, 6 and 11–14, cols. 4-5, lines 15–55, cols. 6-8, lines 40–2, disclosing generation of obstacle candidate blocks/areas in the vicinity of the white line, e.g., straight line, to detect the moving object of Taniguchi), and of Taniguchi**).** means for tracking the obstacle candidate area by comparing an image feature in the obstacle candidate area with an image feature in the search area (i.e., fig. 10A – 10B, cols. 5-6, lines 49-40, indicating detection of candidate area in the search area of the image

Regarding claim 5, the combination of Taniguchi and Takeda teaches, wherein the means for tracking eliminates the obstacle candidate area when a trajectory of the obstacle candidate area tracked over the plurality of frame images is not smooth (Taniguchi, col. 7, lines 45-50, elimination of noise, consider as un-smooth area thus being eliminated).

Regarding claim 7, the combination of Taniguchi and Takeda teaches, the image processing apparatus according to claim 1, wherein means for detecting an obstacle detects when a number of obstacle candidate areas that are determined by the means for determining not to belong to the specific plane is greater than a predetermined number (i.e., figs. 12 and 14, col. 6, lines 48 – 55 and col. 8, 11 – 21, searching candidates blocks having correlation value below the TH, e.g., predetermined value of Taniguchi).

Regarding claim 9, Taniguchi '730 discloses, an image processing apparatus (i.e., fig. 1, image processing 10) comprising: a camera configured to input a plurality of frame images serving as video images (i.e., fig. 1, image input 12, e.g., camera), a tracking unit configured to detect a straight-line component in a direction from each frame image in the plurality of frame images (i.e., col. 4, lines 45 – 66, detection of straight line, it is clear that the line would have a direction) to generate an obstacle candidate area as an image area in a vicinity of the straight-line component (i.e., figs. 3-4, 6 and 11–14, cols. 4-5, lines 15–55, cols. 6-8, lines 40–2, disclosing generation of obstacle candidate blocks/areas in the vicinity of the white line, e.g., straight line, to detect the moving object), to track the obstacle candidate area in an image succeeding each frame image in the plurality of frame images (i.e., figs. 10–12, illustrates time series images t0-1 through t0-10 to correctly detect, e.g., track, the moving objects, col. 2, lines 16-26, cols. 3-4, lines 52-18 and col. 5, lines 55-67), and to produce a tracking result for the obstacle candidate

area (it is noted that, producing the obstacle position and histogram for moving quantity as shown in figs. 11 – 13 consider as determination result, col. 6, lines 1–55 and cols. 7-8, lines 53-21), and a detector configured to determine, using the tracking result of three or more obstacle candidate areas, whether the plural obstacle candidate areas belong to a plane extending in a specific direction (it is noted that, fig. 13, illustrates the obstacle candidate areas in a specific plane, it is clear that each and every plane extend in a specific direction with respect to X and Y coordinates or Xz and Yz coordinates, further as shown in the figs. 12-14, the obstacle candidate areas are determined by using histogram to represent the block of the moving object in time series images, col. 6, lines 1 – 55 and cols. 7-8, lines 53-2) and configured to detect an obstacle based on the determination (i.e., fig. 12, detection of obstacle/object step d5 based on the determination result of steps d1-d4).

Taniguchi suggest detection of the white line as a straight line and indicates the straight line in three dimensional scene appear as a non-straight line (i.e., col. 5, lines 15-22), but does not explicitly indicates horizontal direction.

Takeda (i.e., col. 3, lines 23-43) teaches extracting a section horizontal with a temporally moving direction among a group of images and obtaining straight lines, note that the straight line would be in horizontal direction, since it has been
Obtained from the horizontal section, representing position changes of the object.

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify and improve the processing of moving object detection of Taniguchi in accordance with the teaching of Takeda by extracting horizontal section with a temporal moving direction of the object to obtain the straight lines in horizontal

direction representing the position changes of the object between images to accurately and stably detect the moving object, as suggested by Takeda (i.e., col. 1, lines 65-67).

Regarding claim 11, the combination of Taniguchi and Takeda teaches, the image processing apparatus according to claim 9, wherein the detector is configured to Determine whether the three or more obstacle candidate areas belong to a horizontal plane (i.e., figs. 13 – 14, col. 6, lines 1 – 15, indicating searching, e.g., searching candidate areas, is executed along the X axis, e.g., horizontal plane, to detect the candidates areas in X axis plane of Taniguchi).

Regarding claim 12, the combination of Taniguchi and Takeda teaches, wherein the tracking unit is configured to set an image area in a vicinity of the detected straight-line component as a search area for the obstacle candidate area (i.e., figs. 3-4, 6 and 11–14, cols. 4-5, lines 15–55, cols. 6-8, lines 40–2, disclosing generation of obstacle candidate blocks/areas in the vicinity of the white line, e.g., straight line, to detect the moving object of Taniguchi), and to track the obstacle candidate area by comparing an image feature in the obstacle candidate area with an image feature in the search area (i.e., fig. 10A – 10B, cols. 5-6, lines 49-40, indicating detection of candidate area in the search area of the image of Taniguchi).

Regarding claim 13, the limitations claimed are substantially similar to claim 5 and have been addressed in claim 5 above.

Regarding claim 15, the combination of Taniguchi and Takeda teaches, wherein the detector is configured to detect an obstacle when a number of obstacle candidate areas that are determined by the means for determining not to belong to the specific plane is greater than a predetermined number (i.e., figs. 12 and 14, col. 6, lines 48 – 55 and col. 8, 11 – 21, searching

candidates blocks having correlation value below the TH, e.g., predetermined value of Taniguchi).

Regarding claim 17, Taniguchi '730 discloses, an image processing method (i.e., fig. 1, image processing 10) comprising: inputting a plurality of frame images serving as video images (i.e., fig. 1, image input section 12 for inputting plurality of images), detecting, from each frame image in the plurality of frame images a straight-line component (i.e., figs. 3–7, col. 4, lines 45–57, detecting the straight line), generating an obstacle candidate area as an image area in a vicinity of the detected straight-line component (i.e., figs. 3-4, 6 and 11–14, cols. 4-5, lines 15–55, cols. 6-8, lines 40–2, disclosing generation of obstacle candidate blocks/areas in the vicinity of the white line, e.g., straight line, to detect the moving object), tracking the obstacle candidate area in an image succeeding each frame image in the plurality of frame images (i.e., figs. 10–12, illustrates time series images t0-1 through t0-10 to correctly detect, e.g., track, the moving objects, col. 2, lines 16-26, cols. 3-4, lines 52-18 and col. 5, lines 55-67), and producing a tracking result for the obstacle candidate area (i.e., figs. 11–12, illustrates the tracking result, col. 6, lines 16-55), determining using the tracking result of three or more obstacle candidate areas, whether the three or more obstacle candidate areas belong to a plane extending in a specific direction (it is noted that, fig. 13, illustrates the obstacle candidate areas in a specific plane, it is clear that each and every plane extend in a specific direction with respect to X and Y coordinates or Xz and Yz coordinates, further as shown in the figs. 12-14, the obstacle candidate areas are determined by using histogram to represent the block of the moving object in time series images, col. 6, lines 1 – 55 and cols. 7-8, lines 53-2) and producing a determination result (it is noted that, producing the obstacle position and histogram for moving quantity as shown in figs. 11 – 13

consider as determination result, col. 6, lines 1–55 and cols. 7-8, lines 53-21), and detecting an obstacle based on the determination result (i.e., fig. 12, detection of obstacle/object step d5 based on the determination result of steps d1-d4).

Taniguchi suggest detection of the white line as a straight line and indicates the straight line in three dimensional scene appear as a non-straight line (i.e., col. 5, lines 15-22), but does not explicitly indicates horizontal direction.

Takeda (i.e., col. 3, lines 23-43) teaches extracting a section horizontal with a temporally moving direction among a group of images and obtaining straight lines thus would be in horizontal direction representing position changes of the object.

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify and improve the processing of moving object detection of Taniguchi in accordance with the teaching of Takeda by extracting horizontal section with a temporal moving direction of the object to obtain the straight lines in horizontal direction representing the position changes of the object between images to accurately and stably detect the moving object, as suggested by Takeda (i.e., col. 1, lines 65-67).

Regarding claim 19, the combination of Taniguchi and Takeda teaches, the image processing apparatus according to claim 17, wherein the determining step determining whether the three or more obstacle candidate areas belong to a horizontal plane (i.e., figs. 13 – 14, col. 6, lines 1 – 15, indicating searching, e.g., searching candidate areas, is executed along the X axis, e.g., horizontal plane, to detect the candidates areas in X axis plane of Taniguchi).

Regarding claim 20, the combination of Taniguchi and Takeda teaches, the image processing apparatus according to claim 17, wherein the tracking step includes; setting an image

area in a vicinity of the detected straight-line component as a search area for the obstacle candidate area (i.e., figs. 3-4, 6 and 11–14, cols. 4-5, lines 15–55, cols. 6-8, lines 40–2, disclosing generation of obstacle candidate blocks/areas in the vicinity of the white line, e.g., straight line, to detect the moving object of Taniguchi), and tracking the obstacle candidate area by comparing an image feature in the obstacle candidate area with an image feature in the search area (i.e., fig. 10A – 10B, cols. 5-6, lines 49-40, indicating detection of candidate area in the search area of the image of Taniguchi).

Regarding claim 21, Taniguchi '730 discloses, an image processing apparatus (i.e., fig. 1, image processing 10) comprising: means for inputting a plurality of frame images serving as video images (i.e., fig. 1, image input section 12 for inputting plurality of images), means for detecting, from each frame image in the plurality of frame images a straight-line component in a direction in the frame image (i.e., figs. 3–7, col. 4, lines 45–57, detecting the straight line in the frame image which would have a direction) by applying an edge detection filter (i.e., col. 5, lines 23-42, applying filter to extract the image feature and calculate the edge), means for generating an obstacle candidate area as an image area in a vicinity of the detected straight-line component (i.e., figs. 3-4, 6 and 11–14, cols. 4-5, lines 15–55, cols. 6-8, lines 40–2, disclosing generation of obstacle candidate blocks/areas in the vicinity of the white line, e.g., straight line, to detect the moving object), means for tracking the obstacle candidate area in an image succeeding each frame image in the plurality of frame images (i.e., figs. 10–12, illustrates time series images t0-1 through t0-10 to correctly detect, e.g., track, the moving objects, col. 2, lines 16-26, cols. 3-4, lines 52-18 and col. 5, lines 55-67), and producing a tracking result for each obstacle candidate area (i.e., figs. 11–12, illustrates the tracking result, col. 6, lines 16-55), means for determining

using the change of relative two-dimensional positions of three or more obstacle candidate regions between two or more image frames in the plurality of image frames (i.e., fig. 10A – 10B shows determining change of relative two dimensional position, e.g., i,j, and i-2,j-2 of obstacle candidate between two or more image frame in the plurality of image frames), whether the three or more obstacle candidate areas belong to a plane extending in a specific direction (it is noted that, fig. 13, illustrates the obstacle candidate areas in a specific plane, it is clear that each and every plane extend in a specific direction with respect to X and Y coordinates or Xz and Yz coordinates, further as shown in the figs. 12-14, the obstacle candidate areas are determined by using histogram to represent the block of the moving object in time series images, col. 6, lines 1 – 55 and cols. 7-8, lines 53-2) and producing a determination result (it is noted that, producing the obstacle position and histogram for moving quantity as shown in figs. 11 – 13 consider as determination result, col. 6, lines 1–55 and cols. 7-8, lines 53-21), and means for detecting an obstacle based on the determination result (i.e., fig. 12, detection of obstacle/object step d5 based on the determination result of steps d1-d4).

Taniguchi suggest detection of the white line as a straight line and indicates the straight line in three dimensional scene appear as a non-straight line (i.e., col. 5, lines 15-22), but does not explicitly indicates horizontal direction.

Takeda (i.e., col. 3, lines 23-43) teaches extracting a section horizontal with a temporally moving direction among a group of images and obtaining straight lines thus would be in horizontal direction representing position changes of the object.

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify and improve the processing of moving object

detection of Taniguchi in accordance with the teaching of Takeda by extracting horizontal section with a temporal moving direction of the object to obtain the straight lines in horizontal direction representing the position changes of the object between images to accurately and stably detect the moving object, as suggested by Takeda (i.e., col. 1, lines 65-67).

4. Claims 8, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi (US 6,456,730) in view of Takeda et al. (US 5,777,690) further in view of Ishii et al. (US 6,993,159).

Regarding claim 8, Taniguchi '730 discloses, the image processing apparatus according to claim 1 (i.e., fig. 1, image processing 10), including a moving object detection section (i.e., fig. 1, element 16) for detecting the moving object in obstacle candidate areas.

Taniguchi '730 is silent in regards to explicit of, estimating a position of the obstacle in a frame image based on a motion of the three or more obstacle candidate areas.

Ishii in the same field (i.e., figs. 10A – 10B, col. 8, lines 28 – 35) teaches, estimating a position of the obstacle in a frame image based on a motion.

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the moving object detection apparatus of Taniguchi in accordance with the teaching of Ishii to estimate a position of the moving body, e.g., moving obstacle, in a frame image, to accurately obtain the movement of the moving body as suggested by Ishii (i.e., col. 1, lines 65–67).

Regarding claim 16, Taniguchi '730 discloses, the image processing apparatus according to claim 1 (i.e., fig. 1, image processing 10), including a moving object detection section (i.e., fig. 1, element 16) for detecting the moving object in obstacle candidate areas.

Taniguchi ‘730 is silent in regards to explicit of, estimating a position of the obstacle in a frame image based on a motion of the three or more obstacle candidate areas.

Ishii in the same field (i.e., figs. 10A – 10B, col. 8, lines 28 – 35) teaches, estimating a position of the obstacle in a frame image based on a motion.

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the moving object detection apparatus of Taniguchi in accordance with the teaching of Ishii to estimate a position of the moving body, e.g., moving obstacle, in a frame image, to accurately obtain the movement of the moving body as suggested by Ishii (i.e., col. 1, lines 65–67).

***Allowable Subject Matter***

5. Claims 6 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Contact***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Behrooz Senfi whose telephone number is 571-272-7339. The examiner can normally be reached on M-F 7:00-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Behrooz Senfi/
Primary Examiner
Art Unit 2621